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AUTHOR Templeton, Ian
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ABSTRACT

This review surveys the current literature dealing with the effect of class size on both school finance and educational quality. The literature cited reflects a general agreement on the telling impact of class size on school budgets. However, the material gives little evidence of uniform agreement on the effect of class size on educational quality, be it measured by student achievement or by other standards. (Author/EA)

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Class Size

Ian Templeton

It would be wrong to conclude, based solely on the lack of evidence to the contrary, that class size has no effect whatever on student performance. But on the basis of what has been presented to us, we must caution against the use of pupil-teacher ratios as instant measures of anything remotely approaching the quality of education. Additional studies certainly are warranted, particularly those that deal with the attitudes of teachers on class size and the effect of those attitudes, rather than size itself, on the development of children.

Despite diligent searches and widespread opinion to the contrary, the Commission finds no research evidence that demonstrates improved student achievement resulting from decreasing pupil-teacher ratios.

The President's Commission on School Finance (1972)

The debate over class size (student-teacher ratio) centers on two important factors—finance and educational quality. The impact of class size on school finance is obvious: as class size decreases, more teachers must be hired and more classrooms built. Because instructional costs usually constitute about 80 percent of a school district's expenditures, the added costs can be enormous.

Educators concerned primarily with educational quality argue that it increases as class size decreases. According to this viewpoint, class size should be reduced until an optimum learning size is reached.

The pressure for smaller classes comes largely from teachers and concerned parents. Teachers feel that reduced class size provides a more desirable learning environment for students

and increases a teacher's effectiveness. On the other hand, many administrators, school board members, and voters deny that class size is as important as teachers maintain and assert that any reduction in class size must be judged against the concomitant cost increases.

This paper reviews current literature on the effect class size has on school finance and educational quality. As will be seen, the literature uniformly emphasizes the tremendous impact of class size on school budgets. It does not, however, uniformly agree on the effect of class size on educational quality, whether quality is measured by student achievement or by other methods.

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EFFECT ON FINANCES

Nearly every document on class size mentions the financial impact a reduction in student-teacher ratios would have on a school district's budget. The two examples below indicate the dimensions of this impact as it is described in the literature.

Varner (1968) acknowledges the argument that reducing class size can help optimize learning conditions; he notes, however, that this argument is not as well-defined as that concerning finances. As an example of the potential effect a reduction in class size can have on a school district budget, he offers a hypothetical case:

> The financial consequences of class size can be strikingly illustrated. Let us assume that in a medium-sized school system enrolling 15,000 pupils, the average class size is 30 pupils and the average teacher's salary is $7,000. A reduction in average class size from 30 to 29 pupils would require 17 additional teachers and a budget increase of $119,000 per year. If classes were reduced from 30 to 25 pupils per class, 100 additional teachers would be required. Teachers' salaries alone would add $700,000 to the annual budget requirements of this system.

Earthman (1969) examines the relationship of class size to the use of middle and high school facilities in the planning stage in the Philadelphia school district. Among the factors he considers is the effect of varying student-teacher ratios. For example, one hundred classrooms can serve either 2,500 or 3,500 students, depending on whether the student-teacher ratio is 25 to 1 or 35 to 1.

CLASS SIZE IS NOT IMPORTANT

Drawing from social science research findings on student-teacher ratios, Coleman ([1971]) reports that minor changes in the ratio are insignificant. Educational policymakers, however, seldom acknowledge these findings, and teachers' spokesmen continue to press for reduction in class size. He concludes his report with a review of recent research findings on student-teacher ratios and suggests some conclusions and implications for policymakers.

The influence of class size on academic attainment and student attitudes toward school was investigated at the Edward W. Clark High School (n.d.). Subjects included 224 male and female students randomly scheduled into average (24-27) and above average (45-52) size classes in business law, introduction to business, and government. Analysis of pretest and posttest scores on

teacher-made tests showed no significant difference in achievement for either business law or introduction to business classes, but did indicate a significant difference for the course on government. The document notes that this difference may be attributed to the fact that the students enrolled in the government class were older than the students in the other two classes. Other conditioning factors may have been the subject matter or the instructor's teaching methods. No significant differences in attitudes (satisfaction with the learning environment) were found for any of the three classes, regardless of size.

To produce evidence regarding the influence of class size and class homogeneity on achievement gains in grades 7 and 8, Johnson and Scriven (1967) examined data from 7,500 students in 265 English and mathematics classes. The study measured achievement gains on the reading comprehension and arithmetic test scores from the Iowa Test of Basic Skills. Results indicated that gain differences attributable to class size and variability were generally very small and inconsistent. Because two-thirds of the classes studied consisted of from 23 to 32 pupils, the largest and smallest classes (larger than 34 and smaller than 24 students) were isolated for separate comparison. Even between these extreme groups, no significant difference in achievement gain was found. Although these tests do not measure all types of achievement, they do suggest that attention might better be directed toward reducing the number of classes assigned to one teacher than toward reducing the size of the classes.

Class size was among the variables studied by Corey (1967) in his investigation of the outcomes of introductory psychology classes. Pretest and posttest scores for 180 students in four classes and a control group of 50 students measure changes in student self-concept, self-acceptance, concept of ideal self, degree of personal adjustment, and knowledge of psychology. In general, class size, method of instruction, and difference among instructors did not appear to be important variables in producing affective changes. Neither did academic mastery of psychology appear related to these variables.

Hopper and Keller (1966) report on the relationship between class size and student achievement in junior college writing skills courses. A stratified random sample of 274 students was assigned to three sections of 56 students and four sections of 28 students. Although student preferences varied, pretest and posttest results show that, given the same quality of instructors, program, and students, class size up to 56 does not seem to be a significant variable in the learning of writing skills.

CLASS SIZE IS IMPORTANT

Using statistical comparisons of student achievement tests, Woodson (1968) examines the effects class size has on pupil achievement in 95 school systems. His areas of investigation include whether:

- a measurable relationship can be found between class size and academic achievement of pupils in a given district
- such relationships are the same for pupils of different academic potential
- the size-achievement relationships are the same in various subject areas
- the magnitudes of size-achievement relationships vary when different kinds of class size measures are used
- the size-achievement relationships are the same for districts of different sizes

- the size-achievement relationships are the same from grade to grade

He concludes that there is a small inverse relationship between academic achievement and class size qualified by the following factors:

- This relationship tends to be smaller for pupils of higher scholastic potential than for pupils of lower scholastic potential.
- This relationship tends to be smaller for criteria based upon total achievement test batteries or arithmetic sub-tests than criteria based upon reading sub-tests.
- This relationship tends to be more uncertain of measurement at the sixth grade level than at the fourth grade level.
- This relationship reflects an interplay with school district size. The relationship was essentially obliterated with a group of small, relatively sparsely populated, school districts. However, there was little evidence that district size *per se* reflected itself in the magnitudes of the achievement criteria.
- All of these conclusions are subject to the kinds of class size measures used. The findings from this study raise the possibility that the practice of using "average class size" as the lone measure of class size tends to oversimplify the study of the relationship with pupil achievement.

Vincent (1968b) describes a method for categorizing research on optimum class size in elementary and secondary grades. The Indicators of Quality program observes selected classroom characteristics (individualization of instruction, interpersonal regard, creativity, and group activity) and scores each characteristic positive, zero, or negative. Data from 47 school districts (2,106 elementary and 2,181 secondary classrooms) show a progressively larger difference between positive and negative ratings as class size increases. In the elementary grades a significant break occurs between the 11-15 and 16-20 and the 21-25 and 26-30 class-size intervals. In the secondary grades the only significant break occurs between the 11-15 and 16-20 class-size intervals. Vincent suggests that combining the results of this study with the achievement test criterion will further resolve the class size question.

Olson (1971) reports on a study also using the Indicators of Quality as the criterion of classroom quality. The study of 18,528 classroom observations found seven internal classroom variables that are highly predictive of school system quality. The variables, listed in order of importance, are:

1. style of educational activity
2. subjects taught
3. class size
4. grade level
5. type of teacher (substitute or regular)
6. number of adults in the classroom
7. day of the week the class is taught

He found that smaller classes produce significantly higher scores than larger ones and that there are certain breaking points in the student-teacher ratio at which sharp drops in performance scores occur. These breaking points correspond to those Vincent found, except for an additional breakpoint between the 0-5 and the 5-10 class size in the elementary classes.

A five-year study (1959-1964) that examined the relationship between class size and pupil achievement in reading and arithmetic is reported by Furno and Collins (1967). Data were taken from the Baltimore public school system records of all 16,449 pupils who were in the third grade in 1959. Variables correlated to class size and achievement were pupil home mobility, parental

occupation and level of education, faculty knowledge, faculty experience, and percent of nonwhite faculty. The most important finding of the study was that in 61 percent of the class comparisons the smallest class size grouping (1-25) made significantly greater achievement gains, as measured on standardized tests, than the larger classes. The authors include a review of related research and a description of their research design together with extensive comparative tabulations from the study's findings.

Among the basic questions concerning college teaching that McKeachie [1971] attempts to answer is one on class size. His conclusions indicate that small classes are probably more effective than large for attaining the goals of retention, application, problem-solving, attitude change, and motivation for further learning.

SUMMARY OF THE LITERATURE

After reviewing recent writings on class size, Sitkei [1968] summarized his findings, some of which are as follows:

- Although the research studies of class size are not conclusive, there are twice as many studies in favor of smaller classes over larger classes.
- There is a great deal of variation among school systems and researchers as to what they mean when they speak of a "small" class or a "large" class.
- The evidence would indicate that a general measure of numerical staff adequacy is a better predictor of school quality than average class size.
- Small classes tend to have more variety in instructional methods used than do large classes.
- Desirable practices tend to be dropped when class size is increased; desirable practices are added when class size is reduced.
- Non-classroom personnel are at least as important as classroom teachers.
- If the teacher is not informed of changes in class-size policy, the results are poorer than if he is aware of the situation.

CONCLUSION

A review of the literature reveals uniformity of opinion on the cost of reducing class size: it is expensive. Opinion is quite diverse, however, on the educational value of a reduction. A close look at the criteria used to evaluate the effect of class size on educational quality may indicate the reasons for the diversity in judgment.

The literature that assigns little importance to class size tends to be concerned with student achievement on standardized or teacher-made tests. Of the five documents denying importance to class size, four were concerned primarily with student achievement or performance, and the fifth (Corey) included achievement as one criteria.

Of the five documents that consider class size important, only two (Woodson and Furno and Collins) were primarily concerned with student achievement. Vincent and Olson both used as criteria the Indicators of Quality, which measure processes occurring in the classroom: individualization of instruction, interpersonal regard, creativity, and group activity. McKeachie's criteria—retention, application, problem-solving, attitude change, and motivation for further learning—are more concerned with the product of education than are the Indicators of Quality, but they measure aspects other than simple achievement.

The studies based on the three largest samples are in agreement that class size is important to educational quality. It is not surprising that Vincent and Olson agree on

an optimum class size since they used the same evaluative criteria. Furno and Collins used achievement on standardized tests as their criteria, however, in arriving at the conclusion that the 1-25 pupil group showed the most improvement in their study of elementary students. This is consistent with Vincent's and Olson's findings that in the elementary grades a decline in quality occurs between the 21-25 and the 26-30 class size.

The variations in criteria employed, grade levels studied, and sizes of samples used in the various studies make it nearly impossible to reach any firm conclusions about the relationship between class size and educational quality. It does seem possible, however, to draw several generalizations from the literature:

- Slight reductions in class size (for instance, from 32 to 30 students) will probably produce little difference in student achievement, but will likely produce an improvement in teacher attitudes and performance.
- Reductions in class size cannot be considered apart from the accompanying economic implications.
- The nature of the evaluative criteria may influence conclusions on the effect of reducing class size.

Teaching methods and scheduling practices are two considerations that complicate a discussion of class size. Olson, for instance, found that teaching style is more important than class size in indicating quality. McKeachie also stresses the importance of the teaching methods used. Varner suggests that new methods of classroom organization and staff utilization, which include team teaching, nongrading, flexible scheduling, and independent study, must be considered in determining optimum class size. He summarizes his study of class size as follows:

> In general, both opinion and research tend to agree that in order to produce optimal results—for both pupils and teachers—the size of class must be appropriate to the intellectual-emotional needs of the pupils, the skills of the teacher, the type of learning desired, and the nature of the subject matter.

REFERENCES

Abstracts of the following documents can be located in *Research in Education*. The complete texts are available from the ERIC Document Reproduction Service (EDRS), commercial channels, or both. Publications can be ordered in either facsimile paper copy form or microfiche.

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Address requests to ERIC Document Reproduction Service, P.O. Drawer O, Bethesda, Maryland 20014.

Coleman, Peter. *Pupil-Teacher Ratios and the Use of Research Findings in Educational Policy-Making.* [1971]. 15 pages. ED 058 640 MF $0.65 HC $3.29.

Corey, Gerald F. *An Investigation of the Outcomes of Introductory Psychology.* Whittier, California: Rio Hondo Junior College, 1967. 10 pages. ED 014 966 MF $0.65 HC $3.29.

Earthman, Glen I. *Study of Space Utilization.* Philadelphia: Philadelphia School District, 1969. 33 pages. ED 029 458 MF $0.65 HC $3.29.

Edward W. Clark High School. *The Influence of Class Size on Academic Attainment and Student Satisfaction.* Las Vegas, Nevada: n.d. 80 pages. ED 021 252 MF $0.65 HC $3.29.

Furno, Orlando F., and Collins, George J. *Class*

Size and Pupil Learning. Baltimore: Baltimore City Public Schools, 1967. 153 pages. ED 025 003 MF $0.65 HC $6.58.

Hopper, Harold H., and Keller, Helen. *Writing Skills—Are Large Classes Conducive to Effective Learning.* Fort Pierce, Florida: Indian River Junior College, 1966. 13 pages. ED 012 583 MF $0.65 HC $3.29.

Johnson, Mauritz, and Scriven, Eldon. "Class Size and Achievement Gains in Seventh- and Eighth-Grade English and Mathematics." *The School Review,* 75, 3 (Autumn 1967). 12 pages. ED 016 653 MF $0.65 HC $3.29.

McKeachie, Wilbert J. *Improving Teaching Effectiveness.* Washington, D.C.: [1971]. 27 pages. ED 054 083 MF $0.65 HC $3.29. (Also available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, PREP-25, $0.55.)

Olson, Martin N. "Ways to Achieve Quality in School Classrooms: Some Definitive Answers." *Phi Delta Kappan,* 53, 1 (September 1971), 63-65.

President's Commission on School Finance. *Schools, People, and Money. The Need for Educational Reform. Final Report.* Washington, D.C.: 1972. 157 pages. ED 058 473 MF $0.65 HC $6.58. (Also available from the U.S. Government Printing Office, Washington, D.C. 20402, PR 37.8: SCH 6/SCH 6/3, $1.00.)

Sitkei, E. George. *The Effects of Class Size: A Review of the Research. Research Study Series, 1967-68.* Los Angeles: Los Angeles County Superintendent of Schools, [1968]. 13 pages. ED 043 124 MF $0.65 HC $3.29.

Verner, Sherrell E. *Class Size.* Washington D.C.: National Education Association, 1968. 50 pages. ED 032 614 MF $0.65 HC not available from EDRS. (Available from Publications Sales Section, National Education Association, 1201 Sixteenth St. N.W., Washington, D.C. 20036, No. 434-22810, $1.00.)

Vincent, William S. "Further Clarification of the Class Size Question." New York: Institute of Administrative Research, Columbia University. *IAR-Research Bulletin,* 9, 1 (November 1968). 4 pages. ED 034 303 MF $0.65 HC $3.29.

Woodson, Marshall S. "Effect of Class Size as Measured by an Achievement Test Criterion." New York: Institute of Administrative Research, Columbia University. *IAR-Research Bulletin,* 8, 2 (February 1968). 6 pages. ED 021 320 MF $0.65 HC $3.29.

SUPPLEMENTARY REFERENCES

Anderson, Gary J., and Walberg, Herbert J. *Class Size and the Social Environment of Learning: A Mixed Replication and Extension.* Paper presented at the annual meeting of the American Educational Research Association, New York, February 1971. 19 pages. ED 047 975 Document not available from EDRS. (Available from ERIC Clearinghouse for Science, Mathematics, and Environmental Education, Ohio State University, 1460 West Lane Avenue, Columbus, Ohio 43221, on loan.)

Bartelt, Claudia, and Williams, Phyllis. *Relationship of Class Size and Various Cognitive Variables to Academic Achievement.* Paper presented at the California Educational Research Association meeting, San Diego, November 1971. 9 pages. ED 055 591 MF $0.65 HC $3.29.

Cook, John J., and Blessing, Kenneth R. *Class Size and Teacher Aides as Factors in the Achievement of the Educable Mentally Retarded. Final Report.* Madison, Wisconsin: Division for Handicapped Children, Wisconsin State Department of Public Instruction, n.d. 326 pages. ED 047 484 MF $0.65 HC $13.16.

Rehmus, Charles M., and Wilner, Evan. *The Economic Results of Teacher Bargaining: Michigan's First Two Years. Number 6, The Research Papers in Industrial Relations and Human Resources.* Ann Arbor: Institute of Labor and Industrial Relations, University of Michigan, 1968. 41 pages. ED 025 026 MF $0.65 HC $3.29. (Also available from Publications Office, Institute of Labor and Industrial Relations, P.O. Box 1567, Ann Arbor, Michigan 48106, $1.00.)

Silver, A.B. *English Department Large-Small Class Study: English 50-60. Revised.* 1970. 9 pages. ED 041 586 MF $0.65 HC not available from EDRS.

RESEARCH HIGHLIGHTS

Minor changes in the student-teacher ratio are insignificant. *(Coleman 1971)*

The Indicators of Quality show progressively larger increases in educational quality as class size decreases. *(Vincent 1968)*

A breaking point in the student teacher ratio at which a sharp drop in performance occurs is found between the 11-15 and 16-20 class sizes in secondary schools. *(Olson 1971)*

A general measure of numerical staff adequacy is a better predictor of school quality than average class size. *(Sitkei [1968])*

Instructional and staffing innovations must be considered in determining optimum class size. *(Varner 1968)*

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